



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/936,629	02/07/2002	Peter Maxwell	IO-1008US	7246
24923	7590	12/12/2003	EXAMINER	
PAUL S MADAN MADAN, MOSSMAN & SRIRAM, PC 2603 AUGUSTA, SUITE 700 HOUSTON, TX 77057-1130				MCLOUD, RENATA D
ART UNIT		PAPER NUMBER		
		2837		

DATE MAILED: 12/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.	Applicant(s)	
09/936,629	MAXWELL ET AL.	
Examiner	Art Unit	
Renata McCloud	2837	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) Responsive to communication(s) filed on 03 October 2003.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 6,23,27,31,32,36 and 37 is/are allowed.
- 6) Claim(s) 1-3,5,7-10,15,16 and 18-20 is/are rejected.
- 7) Claim(s) 12-14,17,21,22,24-26,28-30 and 33 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All b) Some \* c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) The translation of the foreign language provisional application has been received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) Notice of References Cited (PTO-892)      4) Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.  
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)      5) Notice of Informal Patent Application (PTO-152)  
3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9/01,10/03.      6) Other:

## DETAILED ACTION

### ***Response to Amendment***

1. In response to the amendment filed 03 October 2003, the following has occurred:
  - (a) The objection to the specification has been withdrawn by the examiner.
  - (b) The claim objections have been withdrawn by the examiner due to changes made by the applicant.
  - (c) The 35 U.S.C. 112 rejections have been withdrawn by the examiner due to changes made by the applicant.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 3, 15, and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Tanenhaus et al (U.S. 6,255,962).

**Claim 3:** Tanenhaus et al teach an apparatus for acquiring seismic data (e.g. Fig. 1), comprising: one or more sensor modules adapted to sense seismic energy (e.g. Fig. 1:MEMS1); and one seismic recorders coupled to the sensor module adapted to record seismic data indicative of seismic energy (e.g. Fig. 7:10'') wherein the sensor module comprises one or more accelerometers, and wherein the accelerometers have one or more axes of sensitivity (e.g. Col. 3:84), wherein the sensor module further comprises a global positioning system receiver (e.g. Fig. 1:67) adapted to synchronize and operation of the sensors to a common time (Col. 8: 51-60).

**Claim 15:** Tanenhaus et al teach a method of acquiring seismic data comprising: sensing seismic energy with one or more sensor modules (e.g. Fig. 1:MEMS1), wherein the one or more sensor modules comprise one or more accelerometers (e.g. e.g. Fig. 3:84); and recording seismic data indicative of the seismic energy using a seismic recorder (e.g. Fig. 7:10'') synchronizing the operation of a seismic sensor module by using a global positioning system signal from a global positioning system receiver within the sensor module (e.g. Fig. 1:67).

**Claim 18:** Tanenhaus et al teach a method of acquiring seismic data comprising: sensing seismic energy with one or more sensor modules (e.g. Fig. 1:MEMS1), wherein the one or more sensor modules comprise one or more accelerometers (e.g. Fig. 3:84); and recording seismic data indicative of the seismic energy using a seismic recorder

(e.g. Fig. 7:10''); determining the degree of coupling between the sensor module and the ground by generating a force (Col. 5:58-64); recording a response of the sensor assembly to the force; and analyzing the response (e.g. Col. 5:65-6:7).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 5, 7, 10, 16, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanenhaus et al (U.S. 6,255,962) in view of VanZandt et al (U.S. 6,075,754).

**Claim 1:** Tanenhaus et al teach an apparatus for acquiring seismic data (e.g. Fig. 1), comprising: one or more sensor modules adapted to sense seismic energy (e.g. Fig. 1:MEMS1); and one seismic recorders coupled to the sensor module adapted to record seismic data indicative of seismic energy (e.g. Fig. 7:10'') wherein the sensor module comprises one or more accelerometers, and wherein the accelerometers have one or more axes of sensitivity (e.g. Fig. 3:84). Tanenhaus et al do not teach force feedback controlled accelerometers. VanZandt et al teach an apparatus for acquiring seismic data (Col. 4: 8-17) comprising one or more force feedback controlled accelerometers (Fig. 6: 600a-c; Col. 9:5-15). It would have been obvious to one having

ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Tanenhaus et al to include force feedback accelerometers as taught by VanZandt et al. The advantage of this would be the ability to adjust the bandwidth without changing the structure of the sensor.

**Claim 2:** Tanenhaus et al and VanZandt et al teach the limitations of claim 1.

Referring to claim 2, Tanenhaus et al teach the sensor modules comprise one or more micro-machined sensor elements (e.g. Fig. 1:MEMS1).

**Claim 5:** Tanenhaus et al and VanZandt et al teach the limitations of claim 1.

Referring to claim 5, Tanenhaus et al teach a controller coupled to the sensor module for controlling the operation of the apparatus (e.g. Fig. 1:26); wherein the sensor module comprises a 3-axis magnetometer for determining the orientation of the sensor module (e.g. Col. 4:24-28).

**Claim 7:** Tanenhaus et al and VanZandt et al teach the limitations of claim 1.

Referring to claim 7, Tanenhaus et al teach the sensor module provides a digital output signal (e.g. Fig. 1:22).

**Claim10:** Tanenhaus et al teach a method of acquiring seismic data comprising: sensing seismic energy with one or more sensor modules (e.g. Fig. 1:MEMS1), wherein the one or more sensor modules comprise one or more accelerometers (e.g. e.g. Col. 3:84); and recording seismic data indicative of the seismic energy using a seismic recorder (e.g. Fig. 7:10'') wherein the sensor module comprises one or more accelerometers, and wherein the accelerometers have one or more axes of sensitivity (e.g. Col. 3:84). Tanenhaus et al do not teach force feedback controlled

accelerometers. VanZandt et al teach an apparatus for acquiring seismic data (Col. 4: 8-17) comprising one or more force feedback controlled accelerometers (Fig. 6: 600a-c; Col. 9:5-15). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the method taught by Tanenhaus et al to include force feedback accelerometers as taught by VanZandt et al. The advantage of this would be the ability to adjust the bandwidth without changing the structure of the sensor.

**Claim 16:** Tanenhaus et al and VanZandt et al teach the limitations of claim 10. Referring to claim 16, Tanenhaus et al teach determining the position of the seismic sensor by using a global positioning system signal from a global positioning system receiver within the sensor module (e.g. Col. 29-41).

**Claim 34:** Tanenhaus et al teach an apparatus for acquiring seismic data (e.g. Fig. 1), comprising: a sensor module adapted to sense seismic energy (e.g. Fig. 1:MEMS1); an accelerometer disposed in the sensor module (Fig. 3:84). Tanenhaus et al do not teach force feedback controlled accelerometers. VanZandt et al teach an apparatus for acquiring seismic data (Col. 4: 8-17) comprising one or more force feedback controlled accelerometers (Fig. 6: 600a-c; Col. 9:5-15). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Tanenhaus et al to include force feedback accelerometers as taught by VanZandt et al. The advantage of this would be the ability to adjust the bandwidth without changing the structure of the sensor.

**Claim 35:** Tanenhaus et al and VanZandt et al teach the limitations of claim 34.

Referring to claim 34, Tanenhaus et al teach the accelerometers have one or more axes of sensitivity (e.g. Fig. 3:84).

6. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanenhaus et al and VanZandt et al as applied to claim 1 above, in view of Ambs (U.S. Patent 6,028,817).

**Claim 8:** Tanenhaus et al and VanZandt et al teach the limitations of claim 1.

Referring to claim 10, Tanenhaus et al teach one seismic recorder (e.g. Fig. 7:10''). They do not teach the recorder being radio recorders. Ambs teaches the one or more seismic recorders are radio seismic recorders (e.g. Col. 2:14-25). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the seismic data acquisition apparatus taught by Tanenhaus et al and VanZandt et al to make the seismic recorders radio seismic recorders as taught by Ambs. The advantage of this would be the ability to send seismic data to a remote location.

**Claim 9:** Tanenhaus et al VanZandt et al, and Ambs teach the limitations of claim 8. Tanenhaus et al, VanZandt et al, and Ambs teach the limitations of claim 9 except for the radio seismic recorders being integral to the sensor modules. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the seismic data acquisition apparatus taught by Tanenhaus et al and Ambs to make the radio seismic recorders integral to the sensor modules, since it has

been held that forming in an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893).

7. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanenhaus et al and VanZandt et al as applied to claim10 above, in view of Orban et al (WO 98/14800).

**Claim 19:** Tanenhaus et al and VanZandt et al teach the limitations of claim 10. Referring to claim 19, they do not teach determining a vector of the sensor module by generating a force; recording a response of the sensor assembly to the force; and analyzing the response. Orban et al teach determining a vector of the sensor module by generating a force; recording a response of the sensor assembly to the force; and analyzing the response (e.g. Col. 2:57-65).

**Claim 20:** Tanenhaus et al and VanZandt et al teach the limitations of claim 10. Referring to claim 20, they do not teach determining the orientation of the sensor module by generating a force at a plurality of source points; recording a response of the sensor module to the force; and analyzing the response. Orban et al teach determining the orientation of the sensor module by generating a force at a plurality of source points; recording a response of the sensor module to the force; and analyzing the response (e.g. Col. 2:57-65). It would have been obvious to one having ordinary skill in the art at the invention was made to modify the seismic data acquiring method taught by

Tanenhaus et al and VanZandt et al to include the teaching of Orban et al. The advantage of this would a method of acquiring seismic data with that allows proper acoustic coupling of sensors to the ground.

***Allowable Subject Matter***

8. Claims 6, 23,27, 31, 32, 36, and 37 are allowed.

Claims 12-14, 17, 21, 22, 24-26, 28-30, and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

9. Applicant's arguments with respect to claims 1-33 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renata McCloud whose telephone number is (703) 308-1763. The examiner can normally be reached on Mon.- Fri. from 8 am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Nappi can be reached on (703) 308-3370. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Renata McCloud  
Examiner  
Art Unit 2837

RDM



ROBERT NAPPI  
SUPERVISORY PATENT EXAMINER